Safer liquid natural gas

After the disaster on Staten Island in 1973 in which 40 people were killed while repairing a liquid natural-gas storage tank, the New York City fire commissioner requested NASA's help in drawing up a comprehensive plan to cover the design, construction, and operation of liquid natural-gas facilities.

The gas-safety program is especially important for New York City as demand for imported liquid natural gas increases and new storage and handling facilities are required. Transforming natural gas into a liquid reduces its volume by a factor of 600 to one, making it desirable to transport and store the fuel in the liquid state.

But hazards include transportation, loading, storage, and the effect of the supercooled liquid on materials. When liquid, the fuel's temperature is minus 256 F. NASA has had extensive experience—and an impressive safely record—in handling similar, highly volatile liquid rocket fuels. The expertise could be transferred almost directly.

Two programs on behalf of New York now are underway. The first transfers the comprehensive risk-management techniques and safety procedures developed for the Apollo and Skylab programs at the Kennedy Space Center. As adapted for the New York Fire Department, the techniques and procedures take the form of an instruction document that includes:

—Determining liquid-gas risks through engineering analyses and tests.

—Controlling these risks by setting up redundant fail-safe techniques.

—Establishing criteria calling for decisions that eliminate or accept certain risks.

The second program, conducted by NASA's Lewis Research Center, called for preparing a liquid-gas safety manual, the first of its kind. The program extends other Lewis-prepared compilations, such as a hydrogen safety manual.

In order to extend the New York programs to other cities, NASA sponsored a two-day risk-management workshop at Kennedy last fall for government and industry officials.

Ambulance handbook

Firefighting and hazards prevention isn't the only safety technology to which space programs have contributed. A checklist devised for the Skylab inflight medical support system has been transferred for public emergencies. The checklist illustrates a procedure for diagnosis, treatment, and stabilization of a wide variety of emergencies.

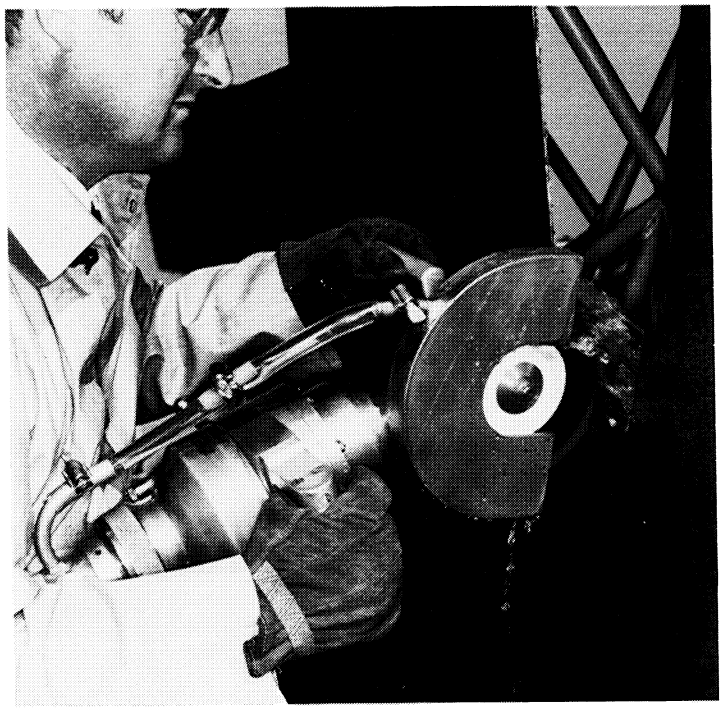
Paramedics assigned to the Houston Fire Department now are using the checklist adapted from a NASA-Johnson handbook. The handbook instructs paramedics in the use and care of a portable ambulance module. The module is a self-contained cardiac diagnostic, therapeutic, and communications system placed in ambulances or used in rural areas.

Organized in Skylab checklist format, the handbook presents a comprehensive, ordered description of the emergency medical equipment and its use in treating victims.

Water-powered tools

Cutting through bulkheads aboard ship during rescue operations is dangerous with acetylene torches or electrical tools. Explosions or short circuits from these methods often add to a disaster instead of reducing it.

Aramco Ltd., a minority firm in New Orleans is planning to produce a tool that uses water under



Water-powered saw cuts through concrete and steel plate, reducing danger of explosion or electric shock in rescue and other operations. Spinoff, Inc. is adapting the device using spacecraft turbo-pump technology.

Ambulance handbook derived from Skylab inflight medical system now is used by paramedics in Houston along with a portable ambulance module, also a space spinoff. The module, shown here in a street lifesaving situation, is a self-contained cardiac diagnostic and communications system.

pressure as its source of power instead of electricity or fuel. The device originally was created by Rockwell International's Rocketdyne division as an underwater tool for divers. It was a direct spinoff of the turbo-pump technology Rocketdyne developed as a major contractor for space missions. After signing a licensing agreement with Rocketdyne, Aramco last year established Space Spin-Offs Inc. in New Orleans to manufacture the hydrotool.

In a prototype unit, an efficient water-powered turbine drives an 8-in.-diameter grinding disk at 6,600 rpm. The exhaust water cools the disk and workpiece, quenching any sparks produced by the butting head. At maximum power the tool easily cuts through quarter-inch steel plate.

Coupled to a municipal water supply or other source producing 100 to 150 psi at a flow of about 100 gallons a minute, the water turbine becomes a safer tool for other uses too. For instance, adapter heads for chain saws, impact wrenches, heavy-duty drills, and power hack saws can be fitted to the hydrotool.

Lead-poison detection

Electro-optical expertise gained in NASA contracts helped Whittaker Corp.'s Space Sciences division to develop an instrument to mass-screen for lead poisoning.

The device is a portable and highly sensitive fluorometer that detects protoporphyrin in whole blood. Free corpuscular porphyrins occur as a very early effect of lead ingestion. The instrument also detects lead in urine, used to confirm the blood tests. The test is inexpensive and can be applied by relatively unskilled personnel.

While lead poisoning may not appear to be a large problem, the fact is that at least 400,000 U.S. children are poisoned by lead every year—some 200 resulting in death. Eating old, chipped, lead-based paint accounts for much of the problem, especially in ghettos among babies and small children. In areas where industrial wastes, mining, and lead smelters are prevalent, mass screening also is desirable.

A similar Whittaker fluorometry device called "drug screen" can measure morphine and quinine in urine much faster and cheaper than other methods.